

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A film comprising a nano-crystalline diamond matrix, wherein the nano-crystalline diamond matrix is substantially free of graphite inclusions and wherein the film has an average root mean square surface roughness of less than 5.00 nm.

Claim 2 (original): The film of claim 1, wherein the infrared absorption peaks between 3200 cm⁻¹ and 2800 cm⁻¹ of the nano-crystalline diamond matrix are at 2930 cm⁻¹ and 2880 cm⁻¹ only.

Claim 3 (original): The film of claim 1, wherein the nano-crystalline diamond matrix has no infrared absorption peaks at 2980 cm⁻¹ and 3100 cm⁻¹.

Claim 4 (original): The film of claim 1, wherein the nano-crystalline diamond matrix has a hardness of at least 60 GPa.

Claim 5 (original): The film of claim 1, wherein the film is between 40 nm and 1000 nm thick.

Claim 6 (original): The film of claim 1, wherein the film is thermally stable at 450 °C or higher.

Claim 7 (canceled)

Claim 8-31 (previously canceled)

Claim 32 (previously presented): The film of claim 1, wherein the film has less than 3 weight percent of graphite.

Claim 33 (canceled)

Claim 34 (currently amended): The film of claim 1 [7], wherein the film has an average root mean square surface roughness of less than 2.00 nm.

Claim 35 (previously presented): The film of claim 34, wherein the film has an average root mean square surface roughness of less than 1.50 nm.

Claims 36-39 (canceled)

Claim 40 (previously withdrawn): The film of claim 1, further comprising a substrate attached to the film.

Claim 41 (currently amended): A film comprising a nano-crystalline diamond matrix, wherein ~~wherein~~ the film has an average root mean square surface roughness of less than 5.00 nm.

Claim 42 (previously presented): The film of claim 41, wherein the film has an average root mean square surface roughness of less than 2.00 nm.

Claim 43 (previously presented): The film of claim 41, wherein the film has an average root mean square surface roughness of less than 1.50 nm.

Claim 44 (new): The film of claim 41, wherein the infrared absorption peaks between 3200 cm^{-1} and 2800 cm^{-1} of the nano-crystalline diamond matrix are at 2930 cm^{-1} and 2880 cm^{-1} only.

Claim 45 (new): The film of claim 41, wherein the nano-crystalline diamond matrix has no infrared absorption peaks at 2980 cm^{-1} and 3100 cm^{-1} .

Claim 46 (new): The film of claim 41, wherein the nano-crystalline diamond matrix has a hardness of at least 60 GPa.

Claim 47 (new): The film of claim 41, wherein the film is between 40 nm and 1000 nm thick.

Claim 48 (new): The film of claim 41, wherein the film is thermally stable at $450\text{ }^{\circ}\text{C}$ or higher.

Claim 49 (new): The film of claim 41, wherein the film has less than 1 weight percent of graphite.

Claim 50 (new): The film of claim 41, wherein the film has intrinsic stress.

Claim 51 (new): The film of claim 41, wherein the intrinsic stress is tensile stress.

Claim 52 (new): The film of claim 41, wherein the intrinsic stress is compressive stress.

Claim 53 (new): The film of claim 41, wherein the film is free of mechanical stress.

Claim 54 (new): A film comprising a nano-crystalline diamond matrix, wherein the nano-crystalline diamond matrix has less than 1 weight percent of graphite.

Claim 55 (new): The film of claim 54, wherein the infrared absorption peaks between 3200 cm⁻¹ and 2800 cm⁻¹ of the nano-crystalline diamond matrix are at 2930 cm⁻¹ and 2880 cm⁻¹ only.

Claim 56 (new): The film of claim 54, wherein the nano-crystalline diamond matrix has no infrared absorption peaks at 2980 cm⁻¹ and 3100 cm⁻¹.

Claim 57 (new): The film of claim 54, wherein the nano-crystalline diamond matrix has a hardness of at least 60 GPa.

Claim 58 (new): The film of claim 54, wherein the film is between 40 nm and 1000 nm thick.

Claim 59 (new): The film of claim 54, wherein the film is thermally stable at 450 °C or higher.

Claim 60 (new): The film of claim 54, wherein the film has intrinsic stress.

Claim 61 (new): The film of claim 54, wherein the intrinsic stress is tensile stress.

Claim 62 (new): The film of claim 54, wherein the intrinsic stress is compressive stress.

Claim 63 (new): The film of claim 54, wherein the film is free of mechanical stress.